

Internship subject

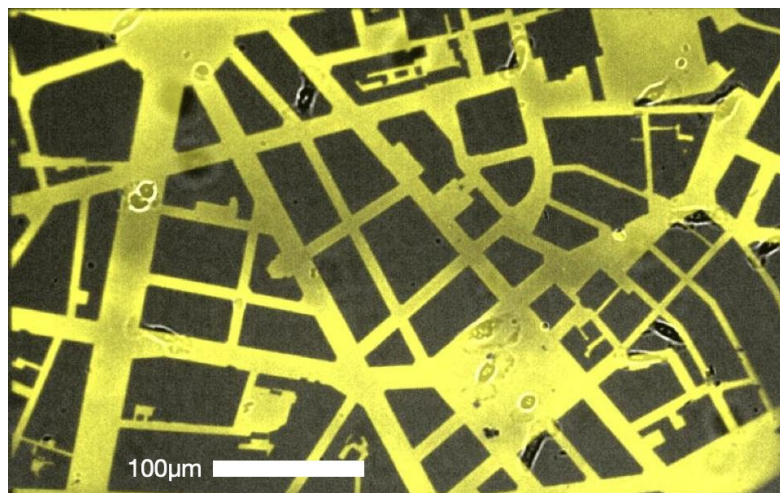
Using cells and protein micro patterns to mimic human crowds in controlled architecture

Confidential subject: No **Subject open to M2:** Yes **to M1-RIT:** Yes **Subject adapted to LabTraining:** Yes

Summary

Active matter systems have are fascinating because they display universal features of emergent self-organization, spanning across multiple space and time scales. Living active matter is a particularly active field, as it is key to helping us understand how living beings behave in groups, whether we concern ourselves with crowds of pedestrians, swarms of insects or colonies of bacteria.

The goal of this internship is to use keratocyte cells extracted from fishes as a model of crowds system. Using protein micropatterns printed with either traditional lithographic techniques or the more recent PRIMO system, the intern will create geometric microenvironments mimicking human scale architectural environment (such as city plans) adapted for cell migration experiments. Fish epidermal keratocytes are outstandingly fit for this task due to their exceptional motility. Combined with fluorescence microscopy, our team have all the elements necessary for a highly-tunable and reliable experimental setup to assess the behavior of cellular flocks.



Keratocyte cells mimicking cars in a micro-printed Grenoble city plan

The principal objective of this internship is to elucidate the interest in using crowds of epidermal fish keratocytes migrating on customized protein micropatterns as a cell model to study the behavior of living active matter (such as human crowds or car traffic). This will effectively acts as a proof-of-concept for a high-quality, easily-reproducible experimental pipeline.

Background and skills expected: The student should be either a physicist or a biologist, who would like to work at the interface between the two disciplines.

Competences that will be acquired during the internship: Cell culture and manipulation, microfluidics, micropatterning, microscopy and data analysis.

Supervisor : Martial BALLAND

Laboratory : Laboratoire Interdisciplinaire de Physique

Team/Group : MOTIV / MicroTiss

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This Master internship could be followed into a PhD within the same research area: Yes